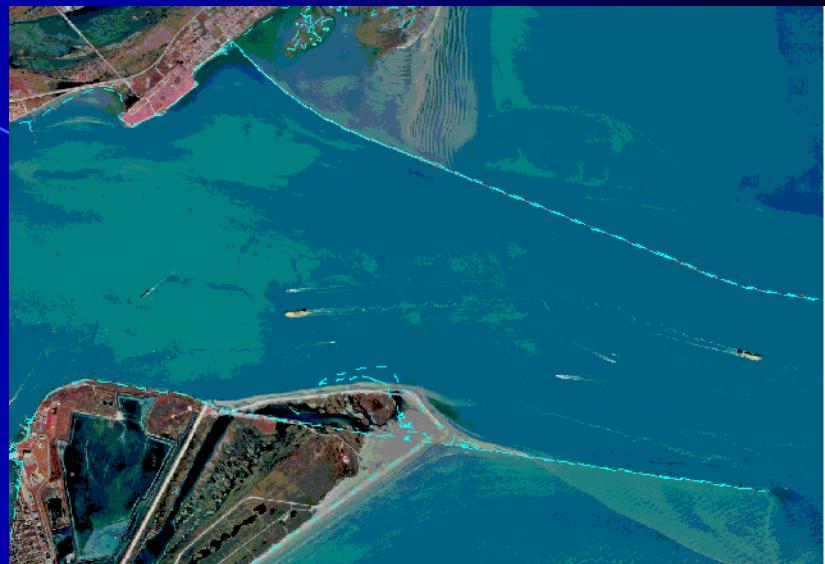




**US Army Corps
of Engineers®**



Storm Generation and Shoreline Response

Mark Gravens ERDC-CHL

Storm Generation

DATABASES:

DRP – Tropical & Extra-tropical storm surge
DRP/CIRP – Tidal constituents
WIS – Hindcast wind waves (Extra-tropical)
WIS – Hindcast wind waves (Tropical)

MODELS:

ADCIRC – Storm surge
WISWAVE – Wind waves

PROCEDURES:

Total water levels (tide + surge)
Wind waves (database/hindcast/analytical)
EST (extended plausible storms)

Wind Waves

- WIS database for extra-tropical events
- SPM methodology for tropical events
- WISWAVE hand-crafted hindcast
- WIS tropical storm hindcast

EST – Extended Plausible Storms

- Compute multiplier using EST
 - Run EST on plausible storms (no random walk)
 - Run EST on plausible storms (w/ random walk)
 - Compare stage frequency and estimate multiplier
 - Use multiplier to “scale” major events
- Develop relationships for duration/surge elevation

Bogue Banks: Data Development & SBEACH Simulations

- Development of Representative Profiles:
 - 60 – profiles covering three communities
Fort Macon, Atlantic Beach, Pine Knoll Shores
 - 10 – representative profiles: FM-R1, FM-R2, AB-R1, AB-R2, AB-R3, AB-R4, PKS-R1, PKS-R2, PKS-R3, PKS-R4
- Storm Development (McCormick)
 - 23 Extra-tropical Storms
 - 37 Tropical Storms
 - 12 Tidal variations plus historic predicted tide
 - 780 Storms (299 Extra-tropical, 481 Tropical)

Bogue Banks Test Bed [STORMS]

- McCormick
 - Three tidal amplitudes
 - Four tidal phases
 - Historical tidal prediction
- 23 – Extra-tropical events by 13 tidal variations
=> 299 plausible extra-tropical events
- 37 – Tropical events by 13 tidal variations
=> 481 plausible tropical events

Bogue Banks:

Data Development & SBEACH Simulations

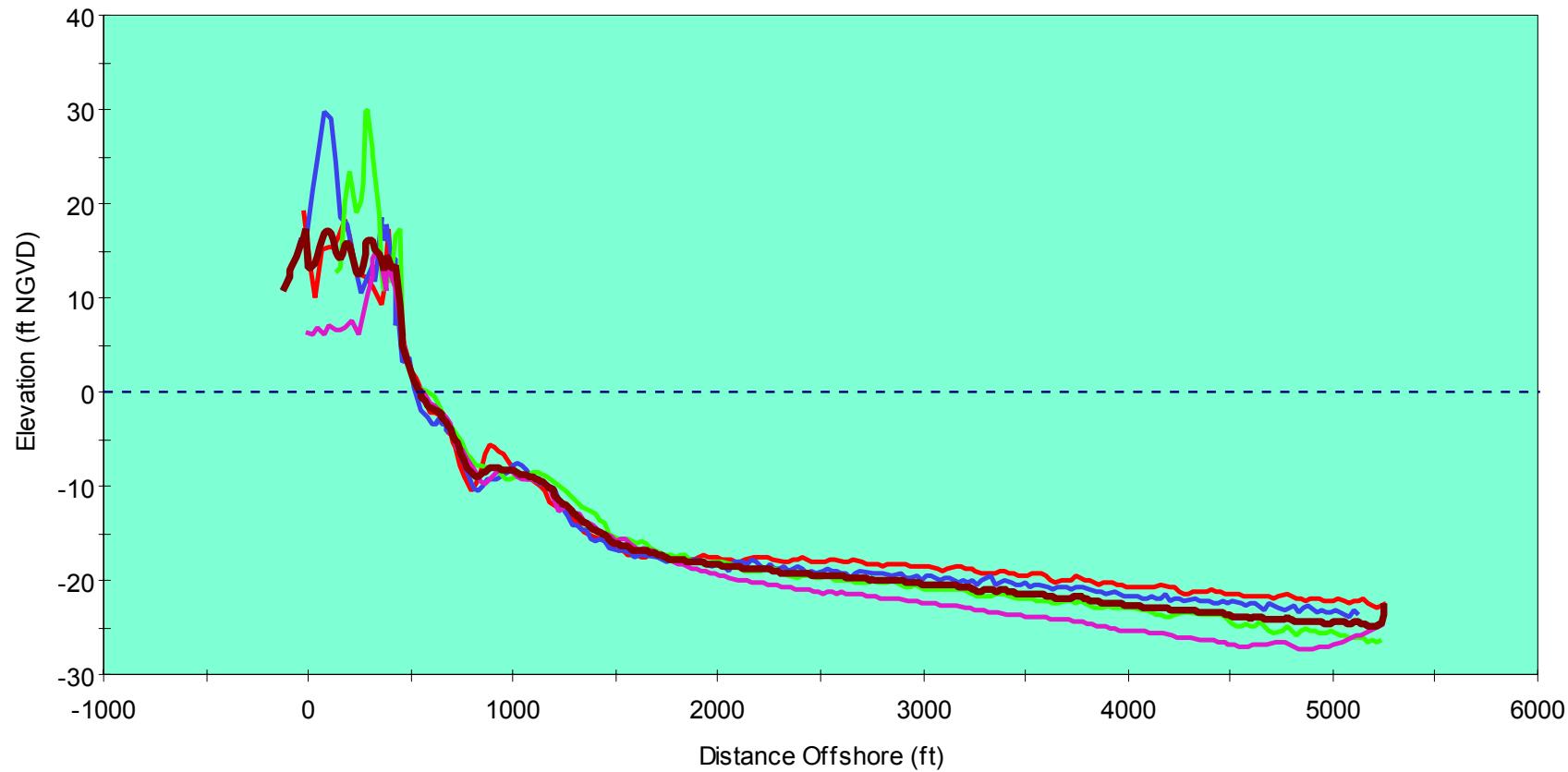
- Reduce focus to Atlantic Beach representative reaches AB-R1 & AB-R2
- Range of profile configurations
 - 11 Berm widths between 0 – 100 ft in 10 ft increments
 - 4 Dune widths between 0 – 12 ft in 4 ft increments
 - 5 Dune elevations between 11.5 – 17.5 ft in 1.5 ft increments
- 222 Profiles reach AB-R1
- 234 Profiles reach AB-R2
- SBEACH Simulations:
456 profiles X 780 Storms => 355,680 simulations

Bogue Banks Test Bed

[PROFILES]

Lower Profile

Bogue Banks April 2001



— BB 004 20010430 Aligned
— BB 007 20010430 Aligned

— BB 005 20010430 Aligned
— Average4_7_2p21_lower Aligned

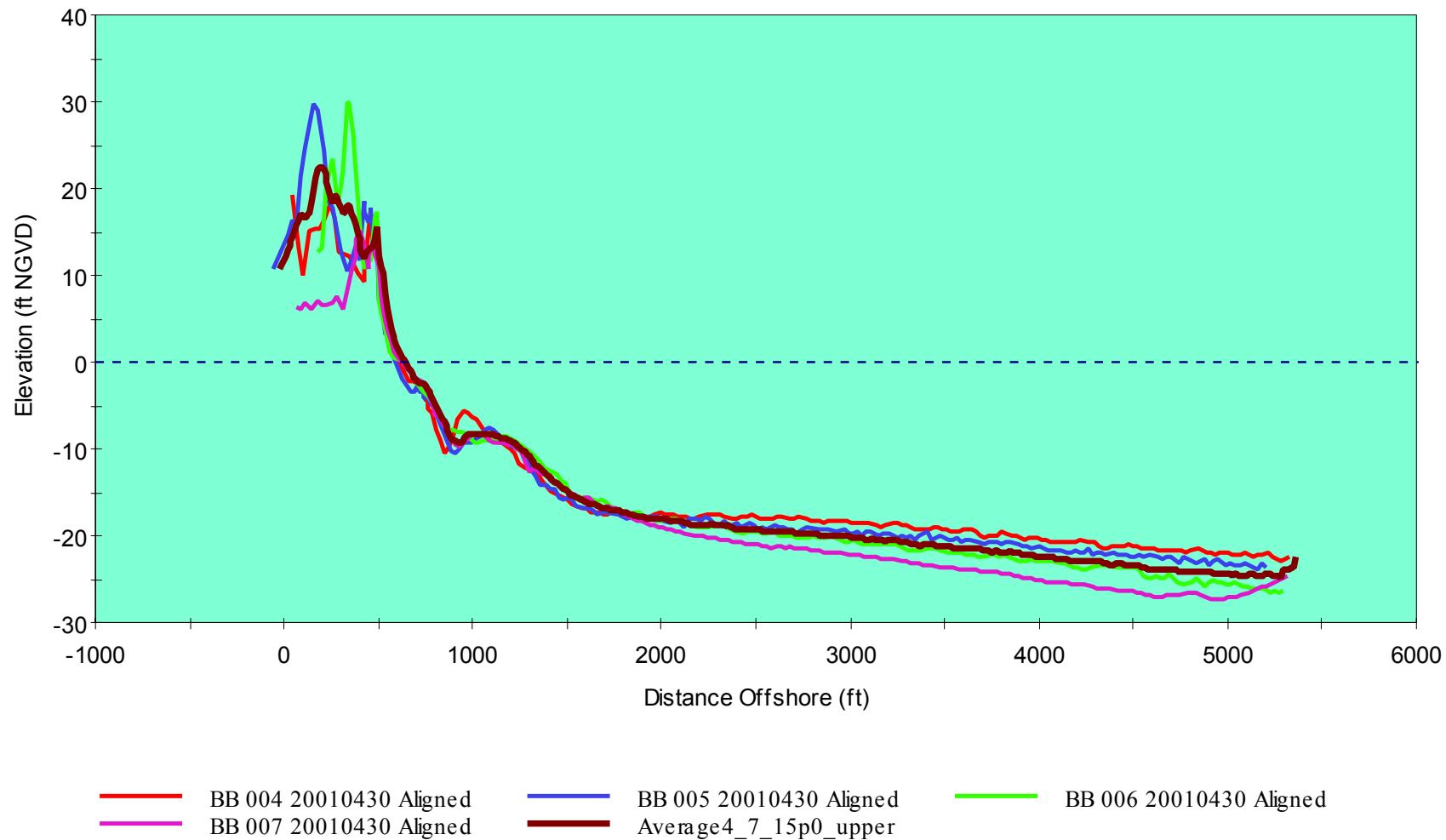
— BB 006 20010430 Aligned

Bogue Banks Test Bed

[PROFILES]

Upper Profile

Bogue Banks April 2001

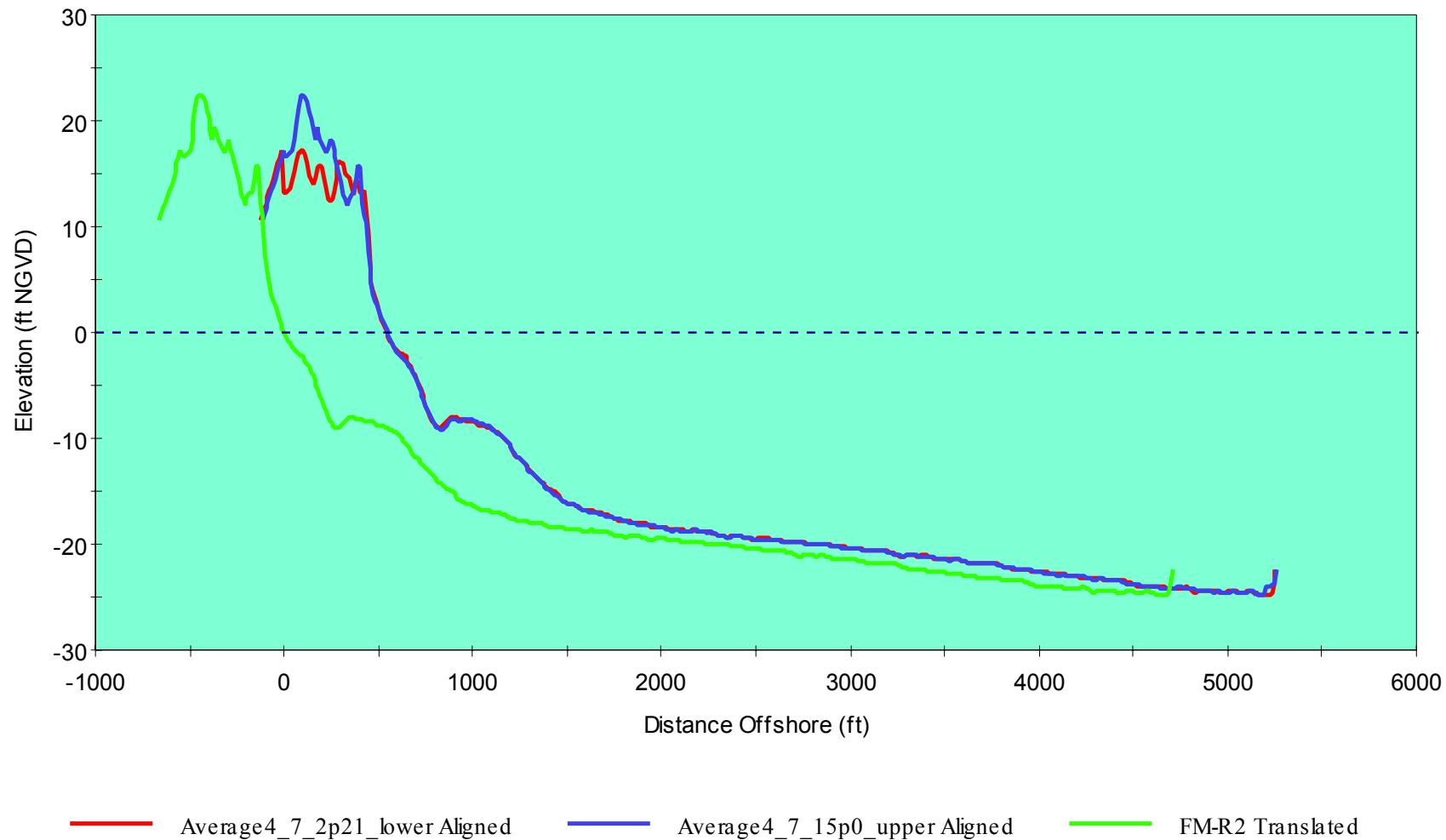


Bogue Banks Test Bed

[PROFILES]

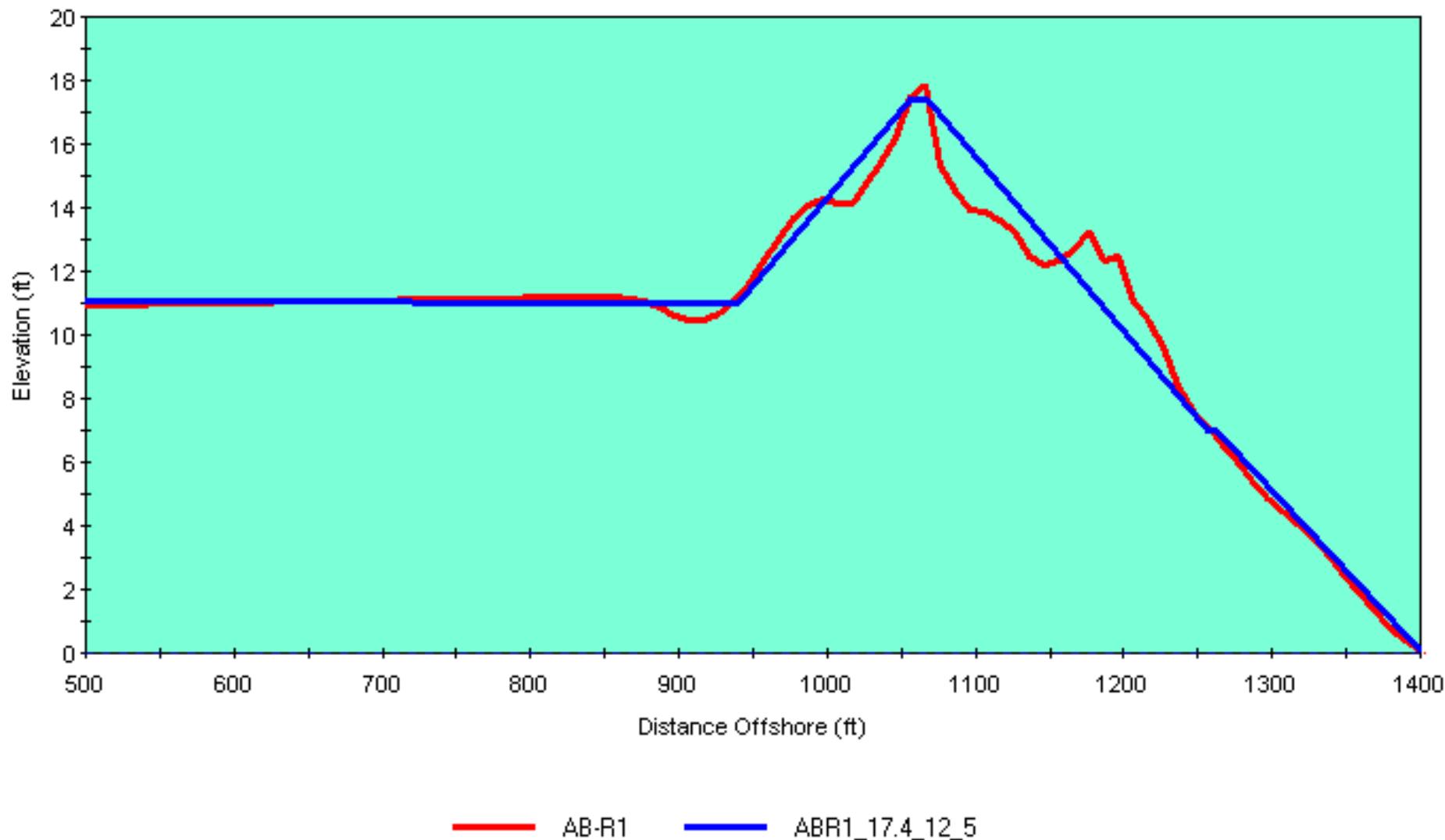
Representative Profile

Bogue Banks April 2001



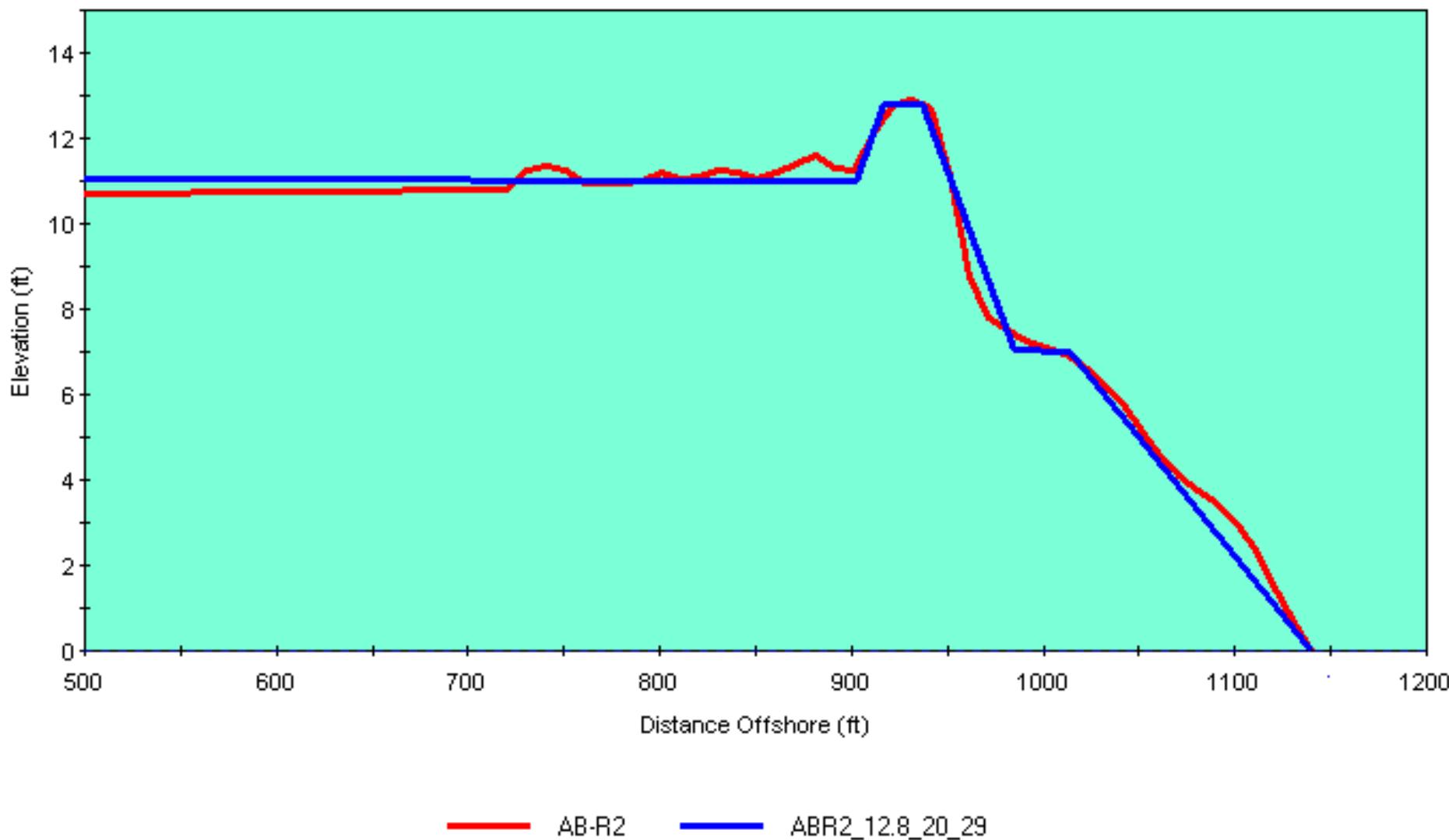
Bogue Banks Test Bed

[Becky representation of PROFILES]



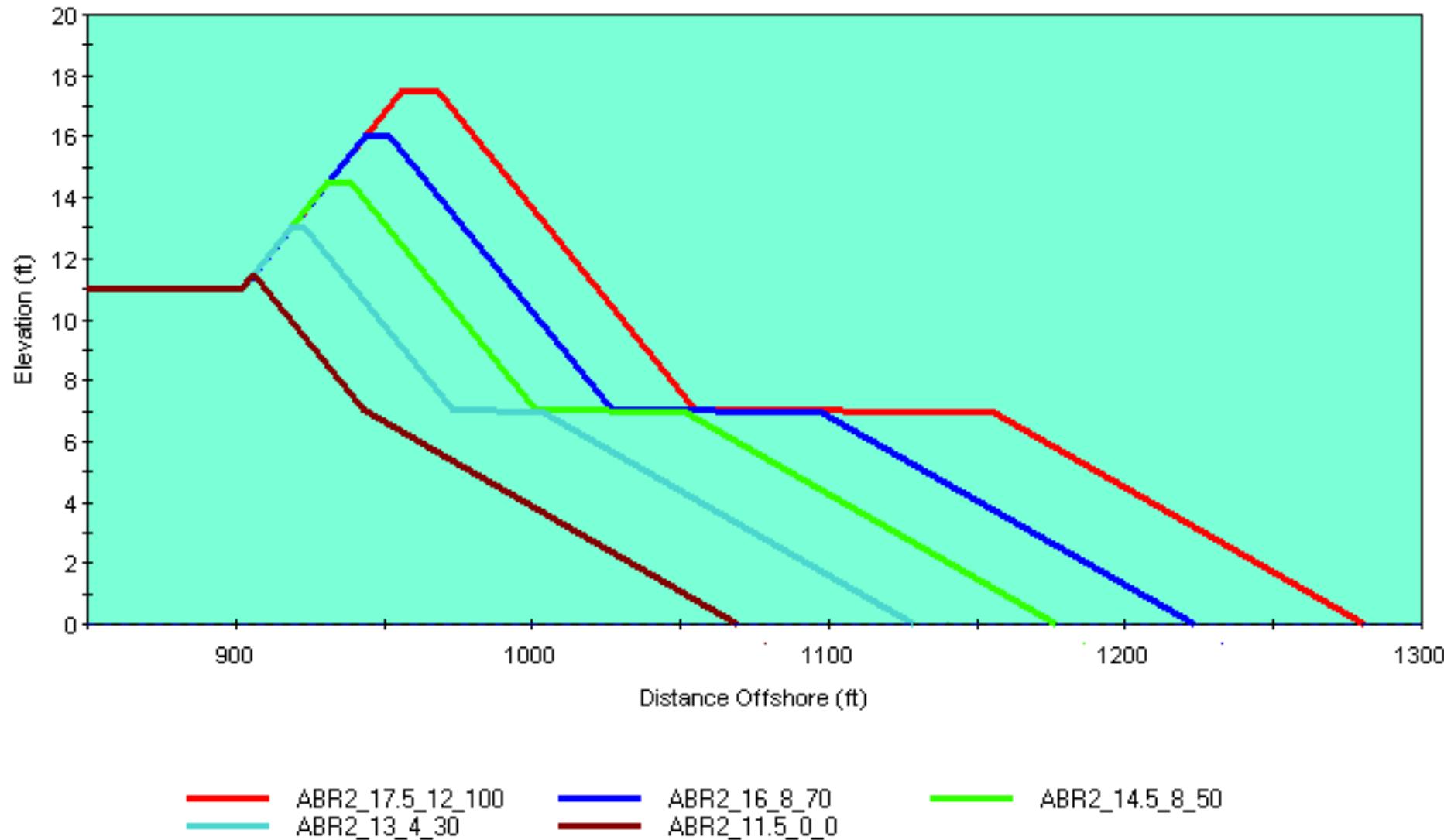
Bogue Banks Test Bed

[Becky representation of PROFILES]



Bogue Banks Test Bed

[Range of PROFILES]



Bogue Banks Test Bed

[SBEACH SIMULATIONS]

